

27th, 28th, 31st; South Carolina, 7th, 21st, 23rd, 27th, 28th; Georgia, 1st, 2nd, 4th to 10th, 20th to 24th, 27th to 31st; northern Florida, 6th, 7th, 22nd, 23rd, 27th; Alabama, 1st, 4th, 6th, 10th, 22nd, 23rd, 27th, 30th, 31st; Mississippi, 1st, 5th, 6th, 9th, 10th, 20th to 24th, 27th, 29th, 30th, 31st; Louisiana, none reported; Arkansas, 1st, 6th, 9th, 10th, 20th, 22nd, 23rd, 27th; Texas, 3rd, 4th, 5th, 8th, 16th, 19th to 23rd, 27th, 30th, 31st; Indian Territory, 8th, 9th, 20th, 22nd, 23rd, 26th, 30th; southern New Mexico, 3rd, 4th, 6th, 7th, 11th to 22nd; southern Arizona, 4th, 8th, 11th to 14th, 18th to 27th; southern California, 1st, 4th, 5th, 6th, 11th, 12th, 15th, 16th, 17th, 19th, 21st, 26th, 27th; at Visalia very heavy frost occurred on the night of the 11th, causing considerable injury to peaches, almonds and figs; at the foot-hills and on the plains nearly all apricots were killed; northern California, 10th, 11th, 12th, 13th, 14th, 16th, 17th; at Red Bluff, on the 13th, 14th and 16th, very heavy frosts occurred, seriously injuring all kinds of fruit in the low-lands and slightly those on the up-lands; Oregon, 2nd, 5th, 6th, 9th, 10th to 17th, 23rd; Washington Territory, 3rd, 6th, 10th, 14th, 15th, 16th.

Ice—in the northern and central sections of the country is fully considered elsewhere in the REVIEW under the head of "*Ice in Rivers and Harbors.*" Its occasional formation in some of the Southern States and along the southern Pacific Coast is reported as follows: Vicksburg, 23rd; Fayette, Miss., 22nd, 23rd; Campo, 11th; Los Angeles, 17th; Benecia Barracks, Cal., 14th; Princeton, Cal., 14th, 16th; Magnolia, Miss., 31st.

PRECIPITATION.

The general distribution of rain-fall (including melted snow) for March, 1881, is shown on chart No. III, from the reports of over 500 stations. From the table in the left-hand corner of the chart is obtained a monthly average for each of the various districts, determined from the records (covering a period of many years) of Signal Service stations, and also a comparison of the present month with such averages. The regions of heaviest precipitation are to be found along the immediate coast of Washington Territory, throughout Alabama and Georgia, in western North Carolina, and from northern New Jersey eastward along the coast of Connecticut and Rhode Island, and thence northward on the Massachusetts coast to Maine. The regions of least precipitation occupy western Montana, southwestern Wyoming, northwestern Utah, northern Nevada, central New Mexico and southwestern Arizona. As compared with the mean of past years, the rain-fall for the present month is in general below the average, only five districts out of a total of seventeen reporting an excess. Departures of excess range from +0.15 in the Eastern Gulf States to +1.67 in New England; those of deficiency, from -0.1 in the Upper Mississippi valley to -4.94 in the Northern Pacific Coast region. The rain-fall of the Rocky Mountain and Plateau districts is quite uniform in the various sections, but the range for the whole territory (from 0.00 to 4.95 inches,) though considerable, is not unusual.

In connection herewith the following notes from voluntary observers may be of interest: Riley, Ill., monthly rain fall 4 inches above the average for March during the past 20 years; largest, 6.5 inches, March, 1877. Belvidere, Ill., monthly rain-fall 1.9 below the average for past 13 years; largest, 6.13 in 1876; smallest, 0.79 in 1873. Lawrence, Kan., monthly rain-fall 0.57 below the average for past 13 years. Gardiner, Me., monthly rain-fall 1.41 above the average of the past 45 years. St. Louis, the Missouri Weather Service reports the monthly rain-fall at the central station as 0.27 below the average for the past 45 years; largest amount, 8.61 in 1865; smallest, 0.79 in 1853. The Nebraska Weather Service reports the monthly rain-fall as about normal in the eastern part of the State, but considerably above in the western part. Newark, N. J., monthly rain-fall 3.02 below the average for the past 37 years; largest amount, 10.00 in 1876; smallest, 0.98 in 1854. Patterson, N. J., monthly rain-fall 16.11; heaviest since 1836. Waterburg, N. Y., monthly rain-fall 0.07 above the average for the past 9 years. North Volney, N. Y., monthly rain-fall 0.65 below the average for the past 8 years. Palermo, N. Y., monthly rain-fall 0.3 below the average for the past 28 years. Wytheville, Va., monthly rain-fall 1.6 below the average for the past 16 years.

Special Heavy Rains.—8th and 9th, Woodstock, Md., 3.25; Sandy Springs, Md., 2.55. 9th, Wilmington, N. C., 2.79; Baltimore, 3.51; Ft. Myer, Va., 2.58. 9th and 10th, New London, 3.69; Fallston, Md., 3.20; New Haven, 3.22; Mystic, Conn., 3.00. 11th and 12th, Mobile, 4.11. 15th, Auburn, Ala., 2.49. 15th and 16th, Tuscaloosa, Ala., 5.08. 16th and 17th, Forsythe, Ga., 5.35; Augusta, Ga., 3.88; Atlanta, Ga., 5.35; McPherson Barracks, 5.15; Aiken, S. C., 3.20. 18th, Tuscaloosa, Ala., 3.90; McPherson Barracks, 3.15; Fayette, Miss., 3.00. 19th, Paterson, N. J., 5.23 in 10 hours. 19th and 20th, Flushing, N. Y., 2.40; New Haven, 3.16; Somerville, N. J., 2.87; Ft. Columbus, N. Y., 2.64. 20th, Thatcher's Island, 2.61. 30th, Newport, R. I., 2.92.

Largest Monthly Rain-falls.—Patterson, N. J., 16.11 inches; Neah Bay, Wash. Ty., 12.05; Tuscaloosa, Ala., 11.74; Atlanta, Ga., 10.98; New Haven, 10.42; Mobile, 10.41; Forsyth, Ga., 10.00; Thatcher's Island, 9.96; Boston, 9.86; McPherson Barracks, Ga., 9.04; Mt. Washington, 8.51; Newport, R. I., 8.24; Ft. Stevens, Or., 8.18; Somerville, N. J., 8.12; White Plains, N. Y., 8.10; South Lee, Mass., 8.07; Elsworth, N. C., 7.88; Lawrence, Mass., 7.78; Baltimore, 7.59; Ft. Canby, Wash. Ty., 7.58; Auburn, Ala., 7.57.

Smallest Monthly Rain-falls.—Helena, Mont., Grierson's Springs and Ft. Brown, Tex., none; Yuma, Ariz., and Ft. Elliott, Tex., trace; El Paso, Tex., 0.01 inch; Deer Lodge, Mont., 0.02; Albuquerque, N. M., 0.04; Stockton, Tex., and Ft. Mojave, Ariz., 0.06; Rio Grande and Socorro 0.07; St. Vincent, Dak., 0.08; Ft. Bridger, Wy. Ty., and Browns, Nev., 0.13; La Mesilla, 0.14; Ft. Shaw, Mont., Golconda and Beowawe, Nev., 0.15; Ft. Custer, Mont., and Ft. Griffin, Tex., 0.17; Ft. McDermit, Nev., 0.18; Brownsville and Ft. Concho, Tex., and Wadsworth, Nev., 0.20; Mammoth Tank, Cal., 0.22; Santa Maria, Tex., Carlin, Nev., and Texas Hill, Ariz., 0.24; Hot Springs, Nev., and Promontory, Utah, 0.25; Ft. Davis and Laredo, Tex., 0.27; Ft. Pembina and Ft. Totten, Dak., 0.28; Ft. Benton, Mont., and Indianola, 0.29; Ft. Craig, and Ft. Union, N. M., and Humboldt, Nev., 0.30; Ft. Keogh, Mont., 0.31; Cheyenne, Eagle Pass, Carson City, Nev., and Coalville, Utah, 0.32; Ft. Stevenson, Dak., 0.34; Tehama, Cal., 0.36; Ft. Lincoln, Dak., and Battle Mountain, Nev., 0.40; Ft. Wallace, Kan., 0.42; Umatilla, 0.44; Halleck, Nev., and Bismarck, 0.45; Key West, Washakee, Wy. Ty., and Point San Jose, Cal., 0.46; Ft. Missoula, Mont., and Pioche, 0.47; Rock Creek, Mont., and Ft. Garland, Col., 0.48; Galt, Williams and Indio, Cal., and Dodge City, Kan., 0.50.

Rainy Days.—The number of days on which rain or snow has fallen varies as follows: New England, 11 to 25; Middle Atlantic States, 11 to 19; South Atlantic States, 9 to 15; Eastern Gulf States, 3 to 13; Western Gulf States, 9 to 11; Ohio valley and Tennessee, 15 to 22; Lower Lake region, 16 to 23; Upper Lake region, 9 to 18; Upper Mississippi valley, 8 to 15; Missouri valley, 9 to 11; Red River of the North valley, 6 to 11; Texas, 0 to 8; Rocky Mountains, 5 to 12; Middle Plateau, 3 to 10; Southern Plateau, 1 to 11; California, 1 to 8; Oregon, 5 to 21; Washington Territory, 11 to 20.

Cloudy Days.—The number varied in New England from 10 to 24; Middle Atlantic States, 8 to 20; South Atlantic States, 5 to 12; Eastern Gulf States, 4 to 11; Western Gulf States, 6 to 9; Ohio valley and Tennessee, 6 to 21; Lower Lake region, 13 to 21; Upper Lake region, 10 to 16; Upper Mississippi valley, 10 to 18; Missouri valley, 8 to 11; Red River of the North valley, 5 to 9; Texas, 1 to 13; Rocky Mountains, 4 to 10; Middle Plateau, 3 to 8; Southern Plateau, 0 to 5; California, 0 to 6; Oregon, 9 to 14; Washington Territory 5 to 19.

Rain or Snow from a Cloudless Sky.—Bismarck, 18th.

Snow.—In several instances snow has fallen at points having a more southern latitude than occurred during the past month of February. In California, Arizona and New Mexico it fell along the *extreme* southern boundaries; in western Texas it was reported from near latitude 30° on the 20th, and in the northern part of the State as low as latitude 35° on the 18th, 19th and 20th; in Arkansas below latitude 35° on the 21st; in Georgia near latitude 33° on the 21st, 22nd, 29th, 30th, and on the North Carolina coast near latitude 35° on the 5th. In the various districts north of parallel 35° it fell on the following dates: *New England*, 1st to 6th, 11th to 21st, 23rd, 24th, 27th to 31st; *Middle Atlantic States*, 1st, 3rd, 4th, 6th, 12th, 13th, 14th, 23rd to 27th, 30th, 31st; *Tennessee*, 3rd to 6th, 20th to 24th, 29th to 31st; *Ohio valley*, 1st to 7th, 11th, 12th, 13th, 19th to 25th, 29th to 31st; *Lower Lake region*, 1st to 7th, 12th to 15th, 20th to 31st; *Upper Lake region*, 1st to 8th, 12th to 21st, 24th, 27th to 31st; *Upper Mississippi valley*, 1st to 8th, 11th to 25th, 27th to 31st; *Minnesota*, 1st to 8th, 12th to 17th, 24th, 28th to 31st; *Missouri valley*, 1st to 16th, 18th to 22nd, 25th to 31st; *Indian Territory*, 3rd, 4th, 18th, 19th, 20th, 21st; *Rocky Mountains*, 1st to 26th, 28th; *Southern Plateau*, 5th, 6th, 9th, 10th, 13th to 20th; *Middle Plateau*, 1st, 5th, 11th to 18th; *Northern Plateau*, 1st, 2nd, 4th, 5th, 7th, 9th to 18th; *California*, Campo, 13th, 16th, 17th; Visalia, 14th; Red Bluff, 9th, 10th; Ft. Bidwell, 4th, 8th, 9th to 12th, 14th, 15th; *Northern Pacific coast region*, 4th, 9th, 11th to 14th, 16th, 18th.

Largest Monthly Snow-falls.—Mt. Washington, 80 inches; Cisco, Cal., 56; Emigrant Gap, Cal., 54; Rockford, Ill., 47; Pikes Peak, 44; Geneseo, Ill., 39; Riley, Ill., 37; Belvidere, Ill., and Bellefontaine, Ohio, 34; Sterling, Ill., and South Lee, Mass., 33; Elmira, Ill., and Clinton, Iowa, 31; Bloomfield, Wis., and Strafford, Vt., 30; Helvetia, W. Va., 29; Deer Park, Md., 27; North Lewisburg, Ohio, 26; Alta, Cal., and Northport, Mich., 25; Yosemite, Cal., Manitowoc, Wis., Frankford, Mo., Hector, N. Y., Ruggles and Cleveland, Ohio, and Woodstock, Vt., 24; Logansport, Ind., Antrim, N. H., and Battle Creek, Mich., 23; Waterburg, N. Y., and Cincinnati, 22; Niles, Mich., Ashley, Mo., and New Castle, Pa., 21; Ashland, Wis., Morrison and Peoria, Ill., Wabash, Ind., Independence, Iowa, Wooster, Ohio, Wellsboro, Pa., and Lunenburg, Vt., 20.

The following items regarding the remarkably severe snow-storms of the month will be found of interest. Before proceeding with details, it will be well to observe that the storms of the 2nd to 4th and 19th to 22nd were the principal ones of the month; their severity, which was extreme, has not been exceeded during the present winter, and in many localities westward, for the past 25 years. *Illinois*: Riley, 2nd to 4th, terrible storm; snow heaped into enormous drifts, all communication cut off until 4 p. m. of the 7th; 19th, worst storm ever experienced; 18 inches fell in 26½ hours; no travel of any kind until 4 p. m. of the 22nd; churches and schools closed and all business suspended. *Morrison*, month remarkable for heavy snow storms, the injury to business being exceed-

ingly severe. Belvidere, 2nd and 3rd, very heavy storms; all roads impassable until the afternoon of the 7th; no mails for five days; nothing like it ever experienced in this section before; 19th, more violent storm; churches and schools closed and all business suspended, no communication until the 24th; "this March will long be remembered as the month of snow blockades." Chicago, 2nd, heaviest storm that ever occurred in this region, traffic of all kinds almost entirely suspended; street-car companies estimate their loss at \$20,000; over 200 tons of mail-matter accumulated for want of transportation; 4th, blockade continued, only eight car-loads of freight received in past 24 hours; five heavy railroad engines acting together, not sufficient to open the heavy drifts; cattle and hogs suffering dreadfully. Waukegan, 4th, public schools closed; snow-drifts up to the second-story window of houses, and still no abatement. Freeport, 40 car-loads of stock shut up in snow-banks west of station; heaviest storm ever experienced here. *Indiana*: Laconia, 29th and 30th, remarkably heavy snow-storm; all roads blockaded and business suspended. New Corydon, 29th and 30th, heaviest storm for years, snow two feet deep on the level; all roads blockaded and traveling impossible. *Iowa*: Vail, 26th, very heavy storm, all roads blockaded; 31st, all communication still closed. Clinton, storms of the 2nd and 3rd, and 19th and 20th, caused the worst interruption to travel ever experienced in this section; no mails or travel from the 2nd to the 6th, and again from the 19th to the 25th; street-cars could not run a single day during these periods. Davenport, 3rd, very heavy storm, all communication cut off; 11th, all roads again blockaded; 19th, more violent storm, business of all kinds nearly suspended. Dubuque, 2nd, heavy snow, trains blockaded; 3rd, snow drifting badly; 4th, heavy snow, all trains delayed; 7th, blockade opened; 11th, heavy snow, trains again blockaded; 19th, very heavy storm, all communication cut off; 21st, blockade opened. Sioux City, 3rd, all roads within 200 miles of station blockaded, some of them since New Years. *Minnesota*: St. Paul, 4th, all roads blockaded; 11th, roads again impassable; 21st, very violent storm, all communication cut off. St. James, 19th, heaviest snow-storm ever experienced in this section, all roads blockaded. Windom, 31st, severest storm of the season, all roads blockaded; on the open prairie snow 2 to 3 feet deep on the level. *Michigan*: Marquette, 1st to 7th, all roads blockaded with snow, no mails until the 8th; 20th, very heavy storm, roads blockaded with enormous drifts, travel of every kind impossible; 31st, all communication again cut off by huge drifts. *Ohio*: Westerville, 28th to 31st, heaviest storm of the season, all roads blockaded and business suspended. Wooster, 28th to 31st, most remarkable storm ever experienced here; snow-fall, 17 inches; all business closed. West Salem, 31st, an uninterrupted storm for the past 70 hours, snow two feet deep on the level; all business suspended. *Pennsylvania*: Erie, 28th to 31st, heaviest storm of the season; roads blockaded. *Wisconsin*: Embarrass, 2nd to 4th, heaviest snow-storm ever experienced here; roads impassable; several times during the remainder of the month severe storms, accompanied with much drifting, cut off all communication for a number of days at a time. La Crosse, 3rd and 19th, very heavy storms, all roads blockaded. Milwaukee, 4th, heavy snow, continuing since the 2nd; all railroad lines closed, business entirely suspended; all country roads impassable and much suffering for want of food and fuel. Oshkosh, 3rd, worst storm ever known in this section, snow drifted almost mountain high; dwellings, sheds and outhouses buried in snow; in many instances drifts were formed on the north side of buildings, reaching over the roofs to the south side, and again, only the chimneys could be discerned protruding from the peak of some immense drift. Madison, 4th, heavy storm, continuing since the 2nd, roads and streets filled with heavy drifts, and quite impassable; city completely isolated, being cut off from communication with every surrounding point. Elroy, 19th, severest storm of the season; all roads blockaded.

Snow on Ground at end of Month.—North of the 25th parallel the following depths in inches were reported in the various States and Territories: *Maine*, 2 to 7; *New Hampshire*, trace to 40; *Vermont*, trace to 24; *Massachusetts*, 2 to 5; *Connecticut*, trace to 2; *New York*, trace to 24; *New Jersey*, trace to 30½; *Pennsylvania*, trace to 15; *Maryland*, trace to 28; *West Virginia*, 1 to 10; *Ohio*, 3 to 29; *Kentucky*, ¾ to 2½; *Tennessee*, 1 to 5; western *North Carolina*, trace to 2; *Indiana*, 1 to 25; *Michigan*, lower peninsula, ¾ to 60; upper peninsula, 4 to 42; *Illinois*, 1½ to 20; *Wisconsin*, ¾ to 30; *Missouri*, trace to 1; *Iowa*, trace to 24; *Minnesota*, 2 to 6; *Dakota*, 2 to 8; *Nebraska*, trace to 6; *Colorado*, trace to 31½.

Hail.—No storms of marked severity were reported, but frequent falls, with hail-stones of small size, in most cases accompanying thunder-storms, were observed as follows: Rio Vista, Cal., 9th; Poway, Cal., 16th; Wabash, Ind., 3rd; Clinton, Ia., 2nd; Monticello, Ia., 2nd, 11th, 16th; Yates Center, Kan., 15th; Gardiner, Me., 4th; Deer Park, Md., 12th; Fallston, Md., 12th, 30th; Owings Mills, Md., 12th; Sandy Springs, Md., 30th; Woodstock, Md., 29th; Somerset, Mass., 30th, 31st; Westborough, Mass., 30th; Hudson, Mich., 3rd, 21th; Kalamazoo, Mich., 2nd; Thornville, Mich., 3rd; Marshall, Mich., 12th; Fayette, Miss., 18th, stones size of buck-shot, path five miles wide, no damage; San Diego, 16th; Portland, Or., 9th, 11th, 12th; Umatilla, 12th; Fort Canby, Wash. Ty., 11th, 12th; Lewiston, Idaho, 12th; Salt Lake City, 9th; Boise City, 3rd; Albuquerque, N. M., 5th; Santa Fe, 6th, 9th; Fort Cummings, N. M., 9th; Ft. Lapwai, Idaho, 11th; Silver City, N. M., 5th, 10th; Dodge City, 2nd, 10th; Fort Gibson, 15th; Pensacola, Fla., 21st; Indianola, 25th; Mobile, 29th.